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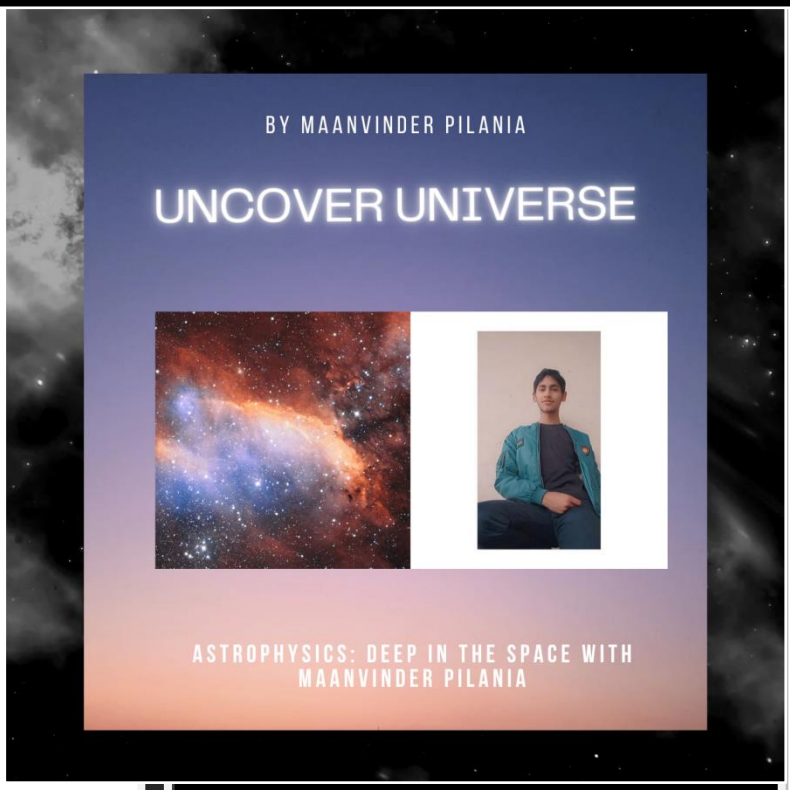
Fermi Bubbles of the Milky Way Galaxy



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Fermi Bubbles of the Milky Way Galaxy

Hello and welcome to the 365 Days of Astronomy podcast. I'm Maanvinder Pilania, your host for today's episode. In this episode I will tell you about the Fermi Bubbles of the Milky Way Galaxy.

In 2010, gamma ray observations by NASA's Fermi Space Telescope revealed an unknown mysterious structure of our home galaxy Milky Way. Astronomers discovered two giant bubbles that emerge below and above the center of our galaxy. They are known as Fermi Bubbles. Each bubble is about 25000 light years long, spanning a total length of about 50,000 light years. The structure spans more than half of the visible sky, from the constellation Virgo to the constellation Grus, and it may be millions of years old. The biggest question that stands still in front of astronomers is what may have actually formed these Fermi bubbles. What do these Fermi bubbles tells us about the past of our Milky Way galaxy. Let's get back into the time and find out.

Fermi Bubbles emit higher energy gamma rays than rest of galaxy's disk. The galactic plane of our galaxy glows brightly in gamma rays. Gamma rays are the most energetic form of light. Their photons drill through human bodies at the speed of light, damaging chromosomes along the way.

Astronomers have found a Supermassive black hole (SMBH) at the heart of many large galaxies including our own Milky Way. The galactic center is home to a Supermassive black hole 4 million times the mass of our sun called Sagittarius A*. SMBH at the centers of galaxies go through different phases, so they can be either active or calm. When a SMBH goes active, it means it is actually feeding on material around it. Around a black hole, there is an accretion disk funneling material into the black hole but all of it doesn't ends up in black hole. As gas falls towards the SMBH, it gets superheated and liberates an enormous amount of energy. As gas spirals towards the black hole, some of the material on disc accelerates at near the speed of light. Then it blasts out from the accretion disc creating huge jets of radiation in both directions. It is possible that Sagittarius A* may have passed through such phase in the past.

Currently Sagittarius A* star is calm and there is some material swirling around it but not very much so that it blasts out jets of radiation but in the past things were different. Six million years ago Sagittarius A* had eaten so much material that it blasted jets of gas out of galaxy creating the scars that we see as Fermi Bubbles. Those jets left destruction that they propagate through. They may have affected the growth of our entire galaxy. SMBH at centre of galaxies are very important because they can either shut down or trigger star formation.

In the center of our galaxy, star formation rate is low, jets could be responsible. Today Sagittarius A* is calm and is helping star formation but Fermi bubbles are evidence of a time when Sagittarius A* shut down the star formation.

Further Reading

https://fermi.gsfc.nasa.gov/science/constellations/pages/bubbles.html

https://www.nasa.gov/mission_pages/GLAST/news/new-structure.html

Links

Google Podcasts:- https://podcasts.google.com/feed/aHR0cDovL2FzdHJvMzY1LmxpYnN5bi5jb20vcnNz/episode/ZmQ5ZjY0MzgtMDI1OC00MTMzLWIwYzgtZjI5OGRjZTQzNjU4?sa=X&ved=0CAUQkfYCahcKEwjopb-gtZL6AhUAAAAAHQAAAAAQAg

Apple Podcasts:- https://podcasts.apple.com/us/podcast/maanvinder-pilania-fermi-bubbles-of-the-milky-way-galaxy/id295908830?i=1000579320207

365 Days of Astronomy:- https://cosmoquest.org/x/365daysofastronomy/2022/09/13/sep-13th-fermi-bubbles-of-milky-way-galaxy/

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